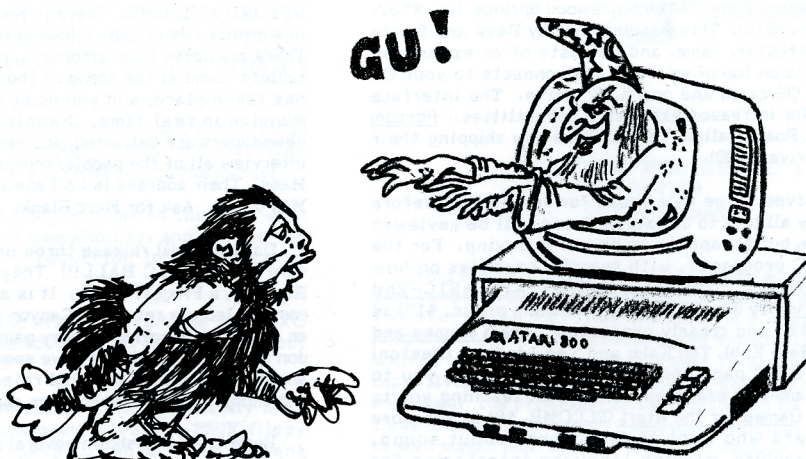


ATARI COMPUTER ENTHUSIASTS

3662 Vine Maple Dr. Eugene OR 97405

July, 1982

Mike Dunn & Jim Bumpas, Editors



BEST OF ACE 1982 1/2 Games

disk \$15 (+\$2 overseas Air)

This is the bargain of the year. All of your favorite games programs from Jan to July + a very special program too long to put in the newsletter. This is a game in BASIC that will really drive you berserk, called "Robot" and written by a very talented local teenager. This program does not work with cassette yet, but the others will be available on a cassette for \$15 and if we can modify it to work, will include it.

BEST OF ACE 1982 1/2 Utility disk, \$15 (+\$2 overseas Air)

This outstanding disk includes Jonestrm, the smart terminal program by Frank Jones, other utilities from our issues from Jan to July, and a very good Financial, Checkbook and Budget programs written by a New Jersey Accountant, Al Giordano for a client and donated to ACE. The only difference between this disk and programs you buy is the lack of documentation and they are not as fancy! Not available on cassette since the programs are designed mostly for disk use. The disk will also include the Random access database example by Kirt Stockwell

Get both on a double sided disk for \$20!!

All proceeds go to a dedicated Bulletin Board system.

Send your orders to our program exchange chairpersons: Chuck and Jody Ross, 2222 Ironwood, Eugene, Or 97401.

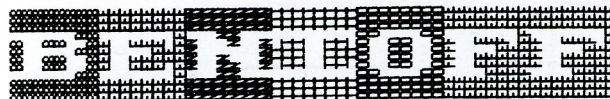
ALL OF ACE

One of our members in Hawaii has gone to the monumental task of taking all of the ACE issues and having them bound! A very impressive book, at least one inch thick with everything to date!! Only \$12 shipped book rate (by ship from Hawaii) +\$3 first class mail or +\$4 overseas Airmail. Send your money to:

George Suetsugu
45-602 Apuapu Street
Kaneohe, HI 96744

Do Not send money to ACE for the Book

All proceeds from the above will go into the special fund for the Bulletin Board System. Anyone who wishes to donate a little extra can do so!!



News bits

There has been so much new software and hardware for the Atari being released that it is hard to keep up. Several companies are coming out with peripherals that expand the hardware capabilities of your Atari. Last month we reported BIT-2's new 80 col. board that plugged into the third slot. Now Compu-Mate 6305 Arizona Ave, L.A. Ca., 90045 has a new expansion interface that is expandable. The basic unit comes with a printer interface that can be configured to use any printer regardless of the word-processor you use by allowing you to make a table to translate commands. It has a RS-232 interface that uses simple commands rather than XIO's; however it will not run present software that uses XIO commands. The Basic unit is \$289. For \$489 you get the basic unit + an 80 col board, but this also needs special software to run-eg, an 80-col version of a word-processor, but can work with basic. They will also have a 64K spooler and a light pen soon. Units can be upgraded at any time.

Another expansion unit is a double-density parallel driven disk drive by Leading Edge (8642A Spicewood Springs Rd. #532, Austin, TX 78766, \$870). This was designed by Dave and Sandy Small of Outpost! Atari fame, and consists of an expansion interface that sits on top of your 800 and connects to your OS slot, a modified OS card, and one 5.25" drive. The interface has extra slots for increased expansion capabilities. Percom (11220 Page Mill Road, Dallas, TX 75243 are now shipping their double density drive (\$800).

We have received three new books for review just before press time. They all look to be excellent and will be reviewed in the next issue, but all appear to be worth buying. For the beginning BASIC programmer, with specific examples on how Atari BASIC differs from others, Instant BASIC-2nd Astounding! Edition by Jerald Brown (dilithium press, \$13) is beautifully written and clearly presented. Atari Games and Recreations by Herb Kohl, Ted Kahn and Len Lindsay (Reston) is an impressive 337 page book that really teaches you to program, using games as examples, rather than teaching you to program games. Games for the Atari (ELCOMP, \$8) is for more advanced readers who want to learn more about sound, joysticks, FM graphics, machine language interfacing for subroutines, etc.-and have many new games! All will be reviewed in the next issue, as well as a new all machine language Intelligent Terminal Program called T.H.E. by Binary, and more on DataPerfect, the review of which begins in this issue.

Attention Australian Members

A new ACE chapter with a fine newsletter would like you to know about them!

ACE (N.S.W.)

c/o Paul Phillips, 78 Ayres Rd., St. Iyres, N.S.W. 2075 (449-6286)

Micro-Probe

C3/41 Osborne Ave
Glen Iris, vitoria, 3146

This is an incredible effort by David Jones-Ellis-a 50 to 70 page each quarterly with no advertising, very technical and mostly machine language stuff that is more advanced than anything in the US. \$12 year- for US readers who really want the machine language stuff, write and ask what you need to pay- the first two issues are fantastic.



Benioff At Large (Mr.ATARI)

Hello, and welcome to another exciting issue of ACE, and another stimulating Benioff At Large (Mr.ATARI). This month we will be adding a NEW feature to the column called "Ask Mr. ATARI". This feature will allow you, the readers, to write to me and have questions answered in ACE!! Is that a thrill, or what!(Wow!-ed.)

Among new software products being released for the ATARI are the following:

1)NEW from InfoCom software!! Infocom, Inc. is one of the largest software text adventure companies making software for microcomputers. They make software for almost all of the systems and now this month have released their adventures for the ATARI! They released three programs. Zork I, and Zork II, are underground adventure programs. You can type in full sentences to the computer, and then it responds with the answer. One word for this is: Fantastic. I bet you thought I was going to say "AWESOME!!". But, hold on. DEADLINE IS BEYOND AWESOME. There is just too much to tell. It comes in a manila file holder, allowing for about ten different items. There are notes from attorneys, police, coroners, and even five tablets found at the scene of the crime. What crime? A murder has taken place, and you must find the murderer in a huge mansion in real time. People walk around, phones ring, newspapers are delivered, and best of all, you can examine and interview all of the people/things. It is great. Infocom is in Mass. Their address is : 6 Faneuil Hall Marketplace, Boston, MA, 02109. Ask for Marc Blank.

Datasoft will release three new programs this month, and very soon a TRAC BALL!!! They are releasing Pacific Coast Highway, a Frogger re-do. It is as close to frogger as you can come. Also are releasing Canyon Climber, a Donkey Kong, and an excellent Shooting Gallery game. All of these are super. I don't have them yet, but have seen several demonstrations. In about four months they will release a basic compiler. All of the things that DataSoft plans appear excellent.

Recently I was shown several programs which are excellent but I really don't know who did them or who is selling the programs. Froggie is a Frogger rip off directly. It is done by Eddie Fries, but this is all I know. Another is a game called Megalegs by Mega Software. It is an excellent Centipede rip off but I don't know who Mega is. Third is a program called Alien Swarm. It is a very addictive and original game by In Home Software, but who are these people?

This month I bought another On-Line adventure called Ulysses and The golden Fleece. It is a three disk Wizard and the Princess. It is very good, and if you liked Wizard you will love Ulysses.

Gebelli told me that they will be releasing a new version of Andromeda, thank goodness, and that their game Pathfinder will be available soon. Gamma Software sent me a copy of their new game "Hockey". It is a two or more player hockey game for 400 w/cassette.

Atari is rumored to be designing a new disk drive half the size of the 810. Also, the new drives from ATARI now being shipped contain an ANALOG. It is said that instead of the disk drive error of 144 coming on it just says "Lee Pappas greets you".

Speaking of Analog, they just released issue 6 and I am in it!! So run to your local store and pick it up. Oh, all it is in the April column reprinted.

The new ATARI printer will be the Centronics 739. More details on this later. Atari's new machines will be released in December. The 1000 and 600 are the talk of the town.



Loose Bits by Stacy A. Goff

Since stepping down as ACE president I have been busy getting established in a new job; more on that later but first, here is a brief report on NCC/Houston (National Computer Conference).

I managed to put myself in Houston for several days of what has been acclaimed as the largest computing show in the history of the USA. What I saw there will take a while to sink in, but one thing is clear! Microcomputers have caught the interest of the computing world! So what, you might ask? Well, for years the NCC has been the stronghold of large-scale computer systems; even minis had to beg to be involved, not too long ago. Year before last micros were allowed to participate, but were relegated to the basement. This year, micros were the FOCUS of the entire show. Most mainframe computing companies displayed some type of micro, and the crowds in front of the most popular micros were thicker than in front of the kissing booth at the county fair.

Many of the new products were worth noting; you will no doubt read definitive reports in your favorite press. Here are a few choice observations:

- * The new DEC micros, from the Rainbow to the Professional 350, ranging in price from approximately \$3900 to 5000. This system, once available, will be the hottest one on the market.

- * The new Commodore 64, a 64K big brother to the VIC, with excellent graphics, optional CPM compatibility, and a price tag of \$599 will force a quantum reduction in the price of computing.

- * Many portable systems were in evidence, from the \$800 IXO to the Osborne lookalikes to the \$5000 Grid. This area is just beginning to take off.

- * The Japanese companies appeared in force, especially Sony and Hitachi, with their new systems and 3 1/2 inch 250K floppy disks. Atari should jump on these to replace the current woefully inadequate 82K drives.

Many other wondrous systems could be seen. Based upon my experiences, I'll make the following predictions and observations:

- o the cost of systems is going down, in quantum leaps
- o most computer companies are concentrating upon the business, rather than home market
- o word processing is STILL the biggest computer-selling application
- o companies that expect to survive should standardize operating systems and languages
- o by Jan. 83 M-DOS will emerge as a new ipso-facto standard, edging out CP/M
- o Just one year later, UNIX (and similar systems) will replace M-DOS in popularity
- o More computers will be sold in 1983 than exist in the entire world today
- o the boom is just beginning

I first encountered the new pyramid sales group for TI computers at the San Francisco Computer Faire. I thought it was a novel way to sell computers, by selling dealerships, and worried a little about the prospect of unknowledgeable folks selling computers. Besides, there is not really enough 'headroom', or markup, to really make a dealership pyramid work. Well, four months later, they have hit the Northwest, and have hit hard. Out-of-work used car salesmen, polyester jackets and white shoes and all, are selling computers, programs and dealerships at fairs, office equipment shows, and on street corners. The good news is that they are setting up support groups for the systems they market. I only hope they don't do more harm than good.

As I mentioned earlier, I have been spending time getting acquainted with a new job. I stepped down as ACE president because of my time out of town, but have remained active in the group. I am now a information systems training consultant, and spend some 50% of my time on the road, traveling all over the continent. I've decided to take advantage of my trips to continue 'spreading the word'. I began by checking the ACE mailing list before visiting an area, and recording members names and phone numbers. Then, time allowing, I have contacted those members and visited with them while in their town. This has worked out very well; we have had some spirited discussions, and I enjoy kibbutzing about our latest doings. For example, I called a Toronto member, and he set up a very enjoyable get-together with two local Atari groups. Visiting with new friends with common interests is yet another pleasure I derive from my Atari.



DATA PERFECT REVIEW by Kirt Stockwell

During the past month it has been both my pleasure and my pain to review one of the most sophisticated pieces of software I've ever seen for the Atari. As a professional programmer/tutor, I appreciate the complexity of a program such as this. The program itself is quite good, and the capabilities for truly worthwhile data manipulation are enormous. The program can be configured by the User in all three areas; Input format, Calculations, Output format. Sorting is also supported. Another important feature, that I feel many may want to take advantage of, is the compatibility with LETTER PERFECT. As home computers begin to be used as computers more often than as game machines, the potential offered by programs such as this will be invaluable.

DATA PERFECT reacts to and interfaces with the user almost exactly the way LETTER PERFECT does, so you won't be in for too many surprises there. Formatting the input is relatively straight-forward, and once this is accomplished, the actual entry of data is very simple. The formatted input screen is a feature that I like to include in my own programs, and is part of a concept we call "USER FRIENDLY".

Overall, I would give an excellent rating to this very complex, very well executed piece of programming.

About the documentation.....

After two years reading obscurely written reference manuals for obscure software and operating systems, then teaching what I had learned, I feel that I am fairly good at tracking my way through the jumbled obfuscation that most program authors write. The manual provided ranks with the classics! The XEROX CPV Reference Manual, the IBM 360/370 Time Share Reference Manual, the Atari Basic Reference Manual. Any of you who (whom?) have run through, or into, these gems will know that the problem is. The person or persons who wrote the manual knew the program so intimately that they forgot that there are things that WE don't know about their programs/systems.

I'm still trying to fight my way through the manual, and will give a more detailed report next month. Meanwhile, if you want a VERY GOOD data base processor, this one is. If you are willing to spend several weeks of fairly intensive and consistent study, you can learn to use this program effectively. If you need a powerful data base processor that has mathematical capabilities, DATA PERFECT should be well worth the effort that will be required in order to use it.

RANDOM ACCESS SAMPLE PROGRAM by Kirt Stockwell

As you can see, from the short sample below, random access processing on the Atari is a simple matter..... Actually, I got spoiled rotten using the big XEROX at school. That silly thing will do practically all of the work for you. All you have to do is specify the file type, and the key field/s when opening the file, and the computer does the rest, including automatic ascending key sorting when closing the file. Alas, the world of MICRO is the world of the do-it-yourself'er; you have to do it ALL yourself. There will be a slightly modified version of this program on one of the disks we will be offering for sale soon (to raise the money for the dedicated bulletin board).

The version that will be on disk will be set up for keeping all the pertinent information on your friends and relatives. Meanwhile, if you can type this long turkey in without going crazy and/or completely messing up, then you're a better man than I, Gunga Dinn !!! Next month I will have the room, time, and energy to discuss this with you in depth. Until then, look this over and either some lights will blink on, or you will get totally lost. Feel free to write us if we lose you, because if we lose too many, we will slow down and/or go into more detail.

In the listing provided, the short, heavy black lines are right arrows and down arrows, (three each). The text in quotes between lines 300 and 372 should be entered in INVERSE VIDEO, as these characters are the prompts for the formatted screen input. The program is basically self-explanatory, if you are macho enough to type it all in. Have Fun !!!!

BULLETIN BOARD

The ACE Bulletin Board has been growing by leaps and bounds. After A.N.T.I.C Magazine (297 Missouri St., San Francisco, CA. 94107 \$15.6 issues) had an article about ACE and the ACE Bulletin Board, I have barely been able to get to my computer! Because of the great demand, we have decided to have a fund raising campaign to buy a dedicated system that will be on 24 hours a day and be owned by the club. As you may know, all of the money now goes to the newsletter, and since we do not accept any advertising, we must raise money in other ways. I have started the process by getting call-forwarding for my computer phone, so other members can have the pleasure of being "SYSOP" when they want to and when I am on vacation.

We want to raise enough money to buy a 400 or 800, modem, interface, etc. If at all possible, we will try to get a double-density or 8" disk drive. If any of you out there have a prototype drive that we could get cheap, that would be great. Remember, this will be a dedicated system, which means that it doesn't need to be compatible with Atari disks- just with itself. The more we can store, the more programs we can offer you. Also, if anyone has any used equipment they would like to get rid of cheaply, let me know. We have enough members that we should be able to raise the money quickly! Although others claim to be larger, we keep it quiet and are actually the largest group by far- it is just that most of our members are in small towns and don't come to meetings easily- but the Bulletin Board is a great way to ask questions and keep in touch.

There is also an Atari Users' Group Logo contest. The winner will get The Communicator Kit, plus free CompuServe access, etc. Each group can send 2 logo's in, but it must be in by Aug 1, 1982. If interested, send a logo to our president, Kirt Stockwell.

LOADER.C AND LOADER.D

These two functions are used to load binary data files into BASIC programs. A typical use of these functions is to take a binary load file (created by an assembler or by the DOS "K" binary save command) and make it executable from BASIC. We've all spent too much time entering decimal data statements to get machine language execution in BASIC. These utilities take the drudgery out of the process if you have a binary data file to start with.

LOADER.D converts the binary data file into a file in BASIC LIST format. The file consists of DATA statements representing the bytes of the binary data file. The DATA statements are preceded by a FOR loop which will READ each byte and POKE it into the appropriate memory location. The BASIC LIST file may be ENTERed into the BASIC program of choice. The user can have the program load the data by GOSUBing to the ENTERed lines. Depending on the size of the file to be loaded, this GOSUB could cause a bit of a delay.

LOADER.C takes the process one step farther. If the binary load file represents relocatable object code (i.e., it operates correctly no matter where it is loaded in memory), LOADER.C will load the data into a BASIC string (say \$*) by execution of USR(ADR(\$*),...). LOADER.C creates a BASIC LIST file containing the DIM and actual assignment statements of the variable chosen for loading of the data.

LOADER.D will prompt the user for the name of the input binary load file and the name of the desired output BASIC LIST file. The user will then be prompted for the starting line number of the BASIC LIST file, so choose a line number which will not conflict with those of the program into which you wish to load the data.

LOADER.C will go through the same sequence of prompts. It will also ask for the name of the string variable in which the data will be loaded. The user does not need to specify a dimension for the variable since LOADER.C will compute it automatically.

If you LIST LOADER.D and LOADER.C you will notice the machine language used by the functions was loaded in by using LOADER.C. You will also note that because of the string assignment operations, there is no initialization delay in loading the machine language code.

--Stu Greenberg

Because the above loader programs have machine language subroutines, it couldn't be listed but will be on the "Best of 1982 1/2 Utility Disk".

The Random Access program by Kirt Stockwell was too long to list out also, and will be found on the same disk.

Send a business-size SASE to the Ross' for the new, updated ACE Library List!!

Best of ACE-1981, still available, Disk or Tape, \$8!

July Meeting

Meetings are always on the 2nd Weds night at 7:30. The next meeting will be on July 14, at the Northwest Natural Gas Building on Goodpasture Island Road next to K-Mart. It is off Delta Highway one Exit from Eugene past Valley River Center. See the Axlon 128K RAMDISK in action, new Joysticks, several new books, the bulletin board in action with the two modems mentioned above plus anything else that is new or what you would like to share.

In August, we will have our annual picnic instead of a meeting. Contact Kirt Stockwell if you want to be on the picnic committee.

BRIAN'S ARCADE

BRIAN'S ARCADE

This month I received four awesome new games, the three new games from Data-Soft (Canyon Climber, P.C.H. (Pacific Coast Highway) and Shooting Arcade), I also got Bug Attack, the popular Apple game by Cavalier Computer. Next month in my article I will be doing a joystick test between the Atari joystick, the Video-Command joystick from Zicron International and a brand new joystick called Newport Prostick from Game-Tech.

Canyon Climber is an awesome new arcade-style game which has similarities to none other than the most popular arcade game, Donkey Kong. So far I have found three different screens. In the first screen your goal is to place dynamite on each side of five different bridges. After you have set all of the dynamite on the bridges, you must climb to the top of the screen and push the plunger down. All of the bridges will blow up and you advance to the next level. Your only obstacle in this level is a bunch of angry billy goats. If they see you coming on their territory they will approach you head on and try to buck you off of the bridge. How can you overcome this major obstacle you ask- why you simply press your joystick button at the right time and you will jump over the goat with no injury. On some of the harder levels the goats get smarter and when you try to jump the goat will simply turn around and buck you off the canyon. Your only safe place on the entire screen is the ladders.

After you have cleared that screen you will get to the second screen in the three screen sequence. In the second screen angry indians shoot arrows at you as you head towards the ladders. On the left side of this screen are three things that look like little c's. If you jump up and grab a little c you will now have your little bow that catches the arrows that the indians shoot at you. While you have the bow you cannot jump or climb any ladders, kind a like when you have the hammer in Donkey Kong. One thing I don't like about getting the bow is that it tends to disappear just when you are about to catch an arrow. But the good thing about the bow is you get 500 points for catching each arrow whereas jumping over the arrows you only get 200 points.

After you clear the arrows you will be hoisted up by an unknown force to the third screen. In the third screen your objective again is to get to the top. You have to jump over crevices and jump up onto other levels of the canyons. You have to jump about thirteen times onto different levels of the canyons and over crevices of the canyons. There is only one thing in your way, the birds. The birds don't want you to get to the top so they drop what I think is bird turd but it may be rocks. If the bird turd or rocks hit you you will instantly fall off the canyon and go crashing to the ground. If you clear this level you will receive an extra man and after this level you will go back to setting dynamite on the bridges.

The graphics in Canyon Climber are awesome. The goats are pretty realistic; they even nod their heads, the indians have these really cool looking head dresses with feathers. The birds on the third level have little feet and they even flap and tuck in their wings. The little man you control is also pretty realistic- your little hands move from rung to rung up the ladder and you even move your arms when you run.

The sound in Canyon Climber is not the best I've ever heard but nonetheless it's pretty good. I especially like the footsteps you make when you run. I also like the sound it makes when you fall to the ground with a loud thud.

Canyon Climber is written by Tim Ferris and is available from Data-Soft Inc. for \$29.95 on disc and \$24.95 for cassette.

Pacific Coast Highway or P.C.H. is also an excellent arcade game. There are two different screens that I have found. The first screen is you have to move your frog or turtle or rabbit or whatever it is across an eight lane highway. On the highway

you have to avoid police cars, formula one race cars, funny cars and dragsters (the only safe place on this screen is the sidewalk in the middle of the screen). If you run into one of these cars you will die and an ambulance siren and all will come out and I guess take you to the hospital. After you get to the top of the screen you have to run into what looks like a rabbit then you will move onto a different screen.

The second screen is a river crowded with motor boats (your only safe place in this screen is I guess it's a dock in the middle of the screen). You have to make your animal jump onto the boats without falling into the river. Then when you get to the top of the screen you have to guide your animal to the same thing as in the screen before. After the river you will move back to the highway and the cars. When you get to the second highway screen you will notice a couple things different. The first that the cars move much faster than the earlier screen. You will also notice that the sidewalk is moving right or left and is no longer a safe place to rest.

In the second river screen the boats move a lot faster and the the dock in the middle of the screen also moves right to left and is no longer a safe place to rest.

P.C.H. has some exceptional graphics. I really like the cars and the boats. You can tell what kind of car it is and what kind of boats they are. For instance you can tell which of the cars are formula one racers by the shape and speed of the car.

The sound in p.C.H. is also very good. Once the program is loaded up it goes into a cute little song. There is also a little tune at the beginning of each level and at the beginning of each new animal. One of the options I really like in P.C.H. is the two player option where two players play at the same time. It's kind of like a race to the top.

P.C.H. is written by Ron Rosen. It is available from Data-Soft for \$29.95.

Shooting Arcade is exactly what the title says. You control a little pistol and objects like ducks, rabbits, elephants, etc. The game uses very good sound and graphics. If you like shoot 'em up games I highly recommend this one. It also costs \$29.95 and is available from Data-Soft.

Bug Attack is another very good arcade style game. It is available from Cavalier Computer for \$29.95. Bug Attack in a way resembles the ever popular arcade game Centipede.

In the game you control a little spider and you are being invaded by a number of different bugs. Sometimes the bugs attack by themselves and sometimes they attack in large groups. So far my worst enemy has been the millipedes.

While you are playing the game you will always hear a little song in the background. The song you hear always depends on the bug you are dealing with at the time.

Bug Attack uses very good graphics and awesome sound. For those of you can't wait for Centipedes from Atari I recommend you run down to your local software shop and pick up a copy.

Well thats all for this month. Next month I'll have a joystick comparison and also Marc Benioff's new game The Nightmare.

Brian Dunn

DOCKERS: FROG

*** FROG ***
by Stan Dockers, Rockport, IL

In 'Frog' you play the part of an extremely hungry frog. Your object is to eat all bugs before they reach you. You score points depending on the difficulty level. The level of difficulty can set at the start of the game. Either a joystick or paddle controller can be used although I prefer paddles.

'Frog' contains some special techniques to add special touches to the game. The bugs are made to blink on and off by a VBI routine that changes the bugs color to background color and back. The VBI routine also has an important function in connection with another routine, the Display List Interrupt routine.

The display list is modified (lines 700-720) to change the text area to two mode 2 lines and also to set display list interrupts at three points down the vertical height of the screen. When these interrupts occur, the DLI routine changes the background color depending on a counter which counts the DLIs. During the vertical blank period this counter is reset to zero, ready for the next screen. This technique gives separate colors to the sky, water and score areas.

The character set is changed so the frog can be printed in graphics mode 1. In this mode you have a choice of upper case & punctuation or lower case and graphics symbols. I usually pick the former and change the punctuation starting with that above the numerals on the keyboard, (I leave the quotation mark alone). The set must first be moved from ROM to RAM and I use a machine language routine (stored in ZZ\$) to do this (line 3000).

To move the tongue in various directions you need to keep track of a number of print positions. I put these locations in strings; a set of X's and Y's for each direction (lines 100-120). The positions are recovered from the strings by using the ASC function (see lines 1002 & 1004).

A very useful function in Atari Basic is the the ability to restore data values to the beginning of a certain line. This function is used in picking up the starting positions and increments of the bugs (346 to start or line 347 to continue). Flags [F(I)] keep track of the condition of the bugs; 0 means the bug is not active, 1 - it's in motion and 2 means it hit something.

WAIT and BUG are counters that skip over the start-a-bug and move bug sections. When the counters reach zero a new bug is started or all bugs are moved and the counters set to MAXWAIT & MAXBUG respectively. The larger these maximums, the slower things go and the difficulty level is increased by reducing MAXWAIT & MAXBUG.

I hope you find something useful in the code of this program as well as enjoying the game itself.

Assembly Language Routines for VBI -by Stan Dockers for Frog

```

02C7 10 COLOR3 = $02C7
02C8 20 COLOR4 = $02C8
00CE 30 CNTR1 = $00CE
00CF 40 CNTR2 = $00CF
00D0 50 BUGCOL = $00D0
00D1 60 DLICNT = $00D1
D40A 70 WSYNC = $D40A
D01A 80 COLBK = $D01A
0000 90 X = $0600

0100 ; VBI INSERTION ROUTINE
0600 68 0110 PLA ; Ignore parameter count
0601 A00A 0120 LDY #0A ; Lo byte VBI routine
0603 A206 0130 LDX #06 ; Hi byte VBI routine
0605 A907 0140 LDA #07 ; Deferred VBI
0607 4CCE4 0150 JMP #E45C ; O.S. inserts VBI

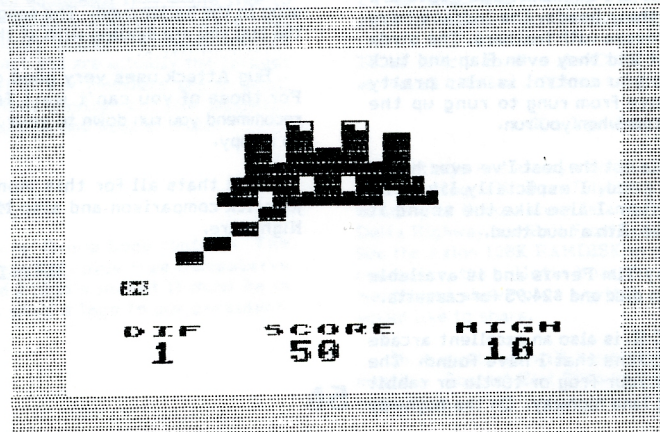
0160 ; VBI ROUTINE TO MAKE BUGS FLICKER
060A ADC702 0170 VBI LDA COLOR3 ; Is bug color as
060D C0C802 0180 CMP COLOR4 ; background color?
0610 F010 0190 BEQ BLACK ; yes
0612 C6CF 0200 DEC CNTR2 ; Count down
0614 D019 0210 BNE OUT ; till next black out
0616 A905 0220 LDA #5 ; Reset off counter
0618 85CE 0230 STA CNTR1
061A ADC802 0240 LDA COLOR4 ; And black out
061D 80C702 0250 STA COLOR3 ; bugs
0620 D00D 0260 BNE OUT
0622 C6CE 0270 BLACK DEC CNTR1 ; Count down till
0624 D009 0280 BNE OUT ; next on period
0626 A90A 0290 LDA #10 ; Reset on counter
0628 85CF 0300 STA CNTR2
062A A5D0 0310 LDA BUGCOL ; Turn bugs back on
062C 80C702 0320 STA COLOR3
062F A900 0330 OUT LDA #00 ; Reset DLI counter
0631 85D1 0340 STA DLICNT
0633 4C62E4 0350 JMP #E462 ; Back to O.S.

0360 ; DLI ROUTINE TO CHANGE BKGD COLOR
0636 48 0370 PHA ; Save A
0637 8A 0380 TXA
0638 48 0390 PHA ; Save X
0639 A6D1 0400 LDX DLICNT ; Index with color
063B B04B06 0410 LDA TABCOL,X ; Get color
063E 80AD4 0420 STA WSYNC
0641 8D1AD0 0430 STA COLBK ; and change bknd
0644 E8 0440 INX ; Set up for next color
0645 86D1 0450 STX DLICNT
0647 68 0460 PLA ; Restore X
0648 AA 0470 TAX
0649 68 0480 PLA ; Restore A
064A 40 0490 RTI ; And return

0500 ; TABLE OF COLORS
064B 98 0510 TABCOL .BYTE $9B,$74

=02C7 COLOR3 =02C8 COLOR4 =00CE CNTR1 =00CF CNTR2
=00D0 BUGCOL =00D1 DLICNT =D40A WSYNC =D01A COLBK
060A VBI 0622 BLACK 062F OUT 064B TABCOL

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SONGS AND RAINBOWS IN ATARI PILOT

by Ruth Ellsworth

As a beginning programmer, I have been a little intimidated by sound and graphics. It was an exciting discovery for me to find that I could easily "sing a rainbow" in Atari Pilot.

I needed a program to demonstrate sound in Pilot, and my first plunge into sound and graphics took only about 2 hours to program. The program which I have refined and which is included at the end of this article is used to demonstrate the sounds available in Atari Pilot and their corresponding keys on a piano.

I began by drawing a rectangle and the lines to separate the keys so that I needed only one "use module" to indicate black keys. Then I erased one pixel and restored it to indicate the key being played.

After using the program I decided I wanted something a little more distinctive, so I decided to make each key separately and to change its color while being played. I found that the keyboard was made of only four different shaped keys which I then programmed into modules, except that the first key for balance to my eye needed an extra line along the straight edge which accounts for the five modules in the program.

In order to get Pilot to run as fast as possible modules should be placed at the beginning of the program from the most used to the least used. It is also necessary to draw over shapes to change colors satisfactorily because the FILL command leaves a shadow of the color being covered.

```
5 U:*COLORDEMO
10 *COLORDEMO
20 GR: CLEAR
30 C:@B712=0+4 [SET PEN ERASE
TO NEW COLOR--0 GRAY
40 GR: PEN ERASE
45 PA: 90
50 C:@B712=16+4 [1 LIGHT ORANGE
E
60 GR: PEN ERASE
70 PA: 90
80 C:@B712=32+4 [2 ORANGE
90 PA: 90
100 C:@B712=48+4 [3 RED ORANGE
110 PA: 90
120 C:@B712=64+4 [4 PINK
130 PA: 90
140 C:@B712=80+4 [5 PURPLE
150 PA: 90
160 C:@B712=96+4 [6 PURPLE-BLUE
E
170 PA: 90
180 C:@B712=112+4 [7 BLUE
190 PA: 90
200 C:@B712=128+4 [8 BLUE
210 PA: 90
220 C:@B712=144+4 [9 LIGHT BLUE
E-DEFAULT COLOR
230 PA: 90
240 C:@B712=160+4 [10 TURQUOISE
E
250 PA: 90
260 C:@B712=176+4 [11 GREEN-BLUE
E
270 PA: 90
280 C:@B712=192+4 [12 GREEN
290 PA: 90
300 C:@B712=208+4 [13 YELLOW-GREEN
E
310 PA: 90
320 C:@B712=224+4 [14 ORANGE-GREEN
E
330 PA: 90
340 C:@B712=240+4 [15 LIGHT ORANGE
E
350 PA: 90
360 J:*COLORDEMO
370 E:
```

The sound command is SO: followed by a number from 1 to 31 indicating the desired note from low C to high F sharp, and the length of each note is set by PA: followed by 128,64,32,16,8,4 corresponding to whole note, half note, quarter note, eighth note, sixteenth note, and thirty second note respectively. Pilot has four sound registers that allow notes to be played individually or in chords. Each voice must be separated by a comma, and a SO:0 must be used to stop the sound if no other note or the E: command follows.

When I first wrote the program I used the yellow, red, and blue colors usually available in PILOT. I then discovered that the color commands are simple and it is possible to get a wide variety of colors just by poking new colors into the four color pen registers available. One only has to remember that the background color is PEN ERASE. C:@B712=xx assigns color to PEN ERASE, C:@B708=xx assigns color to PEN RED, C:@B709=xx assigns color to PEN YELLOW, and C:@B710=xx assigns color to PEN BLUE. Luminance is determined by the numbers 0 to 7 allowing a great variety of colors although only 15 colors are available. I found, also, that the colors varied with those that surrounded them, so that the range of colors is greater than might at first appear. Color registers are calculated as follows: color register=color number times 16 + luminance times 2. The following short program demonstrates the 15 colors available in middle luminance and how the color register works better than I could possibly explain it. My children drew boxes into the on to the screen and and pokes other colors into the pens to see how the different colors looked together.

PILOT sound and turtle graphics have not only been fun for us as family, but have helped graphics and sound in general make more sense. I cannot recommend PILOT as a beginning language for anyone interested in programming and as an introduction to other structured languages.

```
5 R: SOUND DEMONSTRATION
10 GR: CLEAR
20 C:@B712=128+0 [PEN ERASE - BACKGROUND - DARK BLUE
K BLUE
30 C:@B709=0+0 [PEN YELLOW - BLACK
40 C:@B710=144+14 [PEN BLUE - WHITE
50 C:@B708=48+0 [PEN RED - DARK ORANGE RED
60 U:*KEYBOARD
70 U:*MUSIC
80 *E:BLKEY CERASE BLACK KEY
90 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
100 GR: TURNTO180;DRAW14
110 E:
120 *E:LEFTSK CERASE LEFT STRAIGHT KEY
130 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
140 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
150 E:
160 *E:FKY CERASE FIRST KEY
170 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
180 GR: TURN90;DRAW1;TURNTO180;DRAW25
190 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
200 E:
210 *E:KBETWN CERASE KEY BETWEEN
220 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
230 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
240 E:
250 *E:RSK CERASE RIGHT STRAIGHT KEY
260 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
270 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
280 E:
290 *E:BLKEY CERASE BLACK KEY
300 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
310 GR: TURNTO180;DRAW14
320 E:
330 *E:LEFTSK CERASE LEFT STRAIGHT KEY
340 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
350 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
360 E:
370 *E:FKY CERASE FIRST KEY
380 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
390 GR: TURN90;DRAW1;TURNTO180;DRAW25
400 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
410 E:
420 *E:KBETWN CERASE KEY BETWEEN
430 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
440 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
450 E:
460 *E:RSK CERASE RIGHT STRAIGHT KEY
470 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
480 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
490 E:
500 *E:BLKEY CERASE BLACK KEY
510 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
520 GR: TURNTO180;DRAW14
530 E:
540 *E:LEFTSK CERASE LEFT STRAIGHT KEY
550 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
560 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
570 E:
580 *E:FKY CERASE FIRST KEY
590 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
600 GR: TURN90;DRAW1;TURNTO180;DRAW25
610 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
620 E:
630 *E:KBETWN CERASE KEY BETWEEN
640 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
650 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
660 E:
670 *E:RSK CERASE RIGHT STRAIGHT KEY
680 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
690 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
700 E:
710 *E:BLKEY CERASE BLACK KEY
720 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
730 GR: TURNTO180;DRAW14
740 E:
750 *E:LEFTSK CERASE LEFT STRAIGHT KEY
760 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
770 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
780 E:
790 *E:FKY CERASE FIRST KEY
800 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
810 GR: TURN90;DRAW1;TURNTO180;DRAW25
820 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
830 E:
840 *E:KBETWN CERASE KEY BETWEEN
850 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
860 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
870 E:
880 *E:RSK CERASE RIGHT STRAIGHT KEY
890 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
900 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
910 E:
920 *E:BLKEY CERASE BLACK KEY
930 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
940 GR: TURNTO180;DRAW14
950 E:
960 *E:LEFTSK CERASE LEFT STRAIGHT KEY
970 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
980 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
990 E:
1000 *E:FKY CERASE FIRST KEY
1010 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
1020 GR: TURN90;DRAW1;TURNTO180;DRAW25
1030 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1040 E:
1050 *E:KBETWN CERASE KEY BETWEEN
1060 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1070 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1080 E:
1090 *E:RSK CERASE RIGHT STRAIGHT KEY
1100 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1110 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1120 E:
1130 *E:BLKEY CERASE BLACK KEY
1140 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
1150 GR: TURNTO180;DRAW14
1160 E:
1170 *E:LEFTSK CERASE LEFT STRAIGHT KEY
1180 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
1190 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1200 E:
1210 *E:FKY CERASE FIRST KEY
1220 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
1230 GR: TURN90;DRAW1;TURNTO180;DRAW25
1240 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1250 E:
1260 *E:KBETWN CERASE KEY BETWEEN
1270 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1280 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1290 E:
1300 *E:RSK CERASE RIGHT STRAIGHT KEY
1310 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1320 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1330 E:
1340 *E:BLKEY CERASE BLACK KEY
1350 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
1360 GR: TURNTO180;DRAW14
1370 E:
1380 *E:LEFTSK CERASE LEFT STRAIGHT KEY
1390 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
1400 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1410 E:
1420 *E:FKY CERASE FIRST KEY
1430 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
1440 GR: TURN90;DRAW1;TURNTO180;DRAW25
1450 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1460 E:
1470 *E:KBETWN CERASE KEY BETWEEN
1480 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1490 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1500 E:
1510 *E:RSK CERASE RIGHT STRAIGHT KEY
1520 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1530 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1540 E:
1550 *E:BLKEY CERASE BLACK KEY
1560 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
1570 GR: TURNTO180;DRAW14
1580 E:
1590 *E:LEFTSK CERASE LEFT STRAIGHT KEY
1600 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
1610 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1620 E:
1630 *E:FKY CERASE FIRST KEY
1640 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
1650 GR: TURN90;DRAW1;TURNTO180;DRAW25
1660 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1670 E:
1680 *E:KBETWN CERASE KEY BETWEEN
1690 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1700 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1710 E:
1720 *E:RSK CERASE RIGHT STRAIGHT KEY
1730 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1740 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1750 E:
1760 *E:BLKEY CERASE BLACK KEY
1770 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
1780 GR: TURNTO180;DRAW14
1790 E:
1800 *E:LEFTSK CERASE LEFT STRAIGHT KEY
1810 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
1820 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1830 E:
1840 *E:FKY CERASE FIRST KEY
1850 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
1860 GR: TURN90;DRAW1;TURNTO180;DRAW25
1870 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1880 E:
1890 *E:KBETWN CERASE KEY BETWEEN
1900 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1910 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1920 E:
1930 *E:RSK CERASE RIGHT STRAIGHT KEY
1940 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
1950 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
1960 E:
1970 *E:BLKEY CERASE BLACK KEY
1980 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
1990 GR: TURNTO180;DRAW14
2000 E:
2010 *E:LEFTSK CERASE LEFT STRAIGHT KEY
2020 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
2030 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2040 E:
2050 *E:FKY CERASE FIRST KEY
2060 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
2070 GR: TURN90;DRAW1;TURNTO180;DRAW25
2080 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2090 E:
2100 *E:KBETWN CERASE KEY BETWEEN
2110 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2120 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2130 E:
2140 *E:RSK CERASE RIGHT STRAIGHT KEY
2150 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2160 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2170 E:
2180 *E:BLKEY CERASE BLACK KEY
2190 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
2200 GR: TURNTO180;DRAW14
2210 E:
2220 *E:LEFTSK CERASE LEFT STRAIGHT KEY
2230 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
2240 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2250 E:
2260 *E:FKY CERASE FIRST KEY
2270 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
2280 GR: TURN90;DRAW1;TURNTO180;DRAW25
2290 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2300 E:
2310 *E:KBETWN CERASE KEY BETWEEN
2320 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2330 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2340 E:
2350 *E:RSK CERASE RIGHT STRAIGHT KEY
2360 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2370 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2380 E:
2390 *E:BLKEY CERASE BLACK KEY
2400 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
2410 GR: TURNTO180;DRAW14
2420 E:
2430 *E:LEFTSK CERASE LEFT STRAIGHT KEY
2440 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
2450 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2460 E:
2470 *E:FKY CERASE FIRST KEY
2480 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
2490 GR: TURN90;DRAW1;TURNTO180;DRAW25
2500 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2510 E:
2520 *E:KBETWN CERASE KEY BETWEEN
2530 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2540 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2550 E:
2560 *E:RSK CERASE RIGHT STRAIGHT KEY
2570 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2580 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2590 E:
2600 *E:BLKEY CERASE BLACK KEY
2610 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
2620 GR: TURNTO180;DRAW14
2630 E:
2640 *E:LEFTSK CERASE LEFT STRAIGHT KEY
2650 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
2660 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2670 E:
2680 *E:FKY CERASE FIRST KEY
2690 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
2700 GR: TURN90;DRAW1;TURNTO180;DRAW25
2710 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2720 E:
2730 *E:KBETWN CERASE KEY BETWEEN
2740 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2750 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2760 E:
2770 *E:RSK CERASE RIGHT STRAIGHT KEY
2780 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2790 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2800 E:
2810 *E:BLKEY CERASE BLACK KEY
2820 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
2830 GR: TURNTO180;DRAW14
2840 E:
2850 *E:LEFTSK CERASE LEFT STRAIGHT KEY
2860 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
2870 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2880 E:
2890 *E:FKY CERASE FIRST KEY
2900 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
2910 GR: TURN90;DRAW1;TURNTO180;DRAW25
2920 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2930 E:
2940 *E:KBETWN CERASE KEY BETWEEN
2950 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
2960 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
2970 E:
2980 *E:RSK CERASE RIGHT STRAIGHT KEY
2990 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3000 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3010 E:
3020 *E:BLKEY CERASE BLACK KEY
3030 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
3040 GR: TURNTO180;DRAW14
3050 E:
3060 *E:LEFTSK CERASE LEFT STRAIGHT KEY
3070 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
3080 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3090 E:
3100 *E:FKY CERASE FIRST KEY
3110 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
3120 GR: TURN90;DRAW1;TURNTO180;DRAW25
3130 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3140 E:
3150 *E:KBETWN CERASE KEY BETWEEN
3160 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3170 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3180 E:
3190 *E:RSK CERASE RIGHT STRAIGHT KEY
3200 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3210 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3220 E:
3230 *E:BLKEY CERASE BLACK KEY
3240 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
3250 GR: TURNTO180;DRAW14
3260 E:
3270 *E:LEFTSK CERASE LEFT STRAIGHT KEY
3280 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
3290 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3300 E:
3310 *E:FKY CERASE FIRST KEY
3320 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
3330 GR: TURN90;DRAW1;TURNTO180;DRAW25
3340 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3350 E:
3360 *E:KBETWN CERASE KEY BETWEEN
3370 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3380 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3390 E:
3400 *E:RSK CERASE RIGHT STRAIGHT KEY
3410 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3420 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3430 E:
3440 *E:BLKEY CERASE BLACK KEY
3450 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
3460 GR: TURNTO180;DRAW14
3470 E:
3480 *E:LEFTSK CERASE LEFT STRAIGHT KEY
3490 GR: 2(TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25
3500 GR: TURN-90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3510 E:
3520 *E:FKY CERASE FIRST KEY
3530 GR: TURNTO0;DRAW25;2(TURN90;DRAW1;TURNTO180;DRAW25;TURN-90;DRAW1;TURNTO0;DRAW25)
3540 GR: TURN90;DRAW1;TURNTO180;DRAW25
3550 GR: TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3560 E:
3570 *E:KBETWN CERASE KEY BETWEEN
3580 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3590 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3600 E:
3610 *E:RSK CERASE RIGHT STRAIGHT KEY
3620 GR: TURNTO180;DRAW25;TURN90;DRAW1;TURNTO0;DRAW10;TURN-90;DRAW1;TURNTO180;DRAW10;TURNTO90;DRAW10
3630 GR: TURNTO0;DRAW25;TURN90;DRAW1;TURNTO180;DRAW25;TURNTO90;DRAW1;TURNTO0;DRAW10;TURN90;DRAW1;TURNTO180;DRAW10
3640 E:
3650 *E:BLKEY CERASE BLACK KEY
3660 GR: 2(TURNTO180;DRAW14;TURNTO90;DRAW1;TURNTO0;DRAW14;TURNTO90;DRAW1)
3670 GR: TURNTO180;DRAW14
3680 E:
3690
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630 GR: PENBLUE;GOTO-50,25 CKEY 6
 640 U: *LEFTSK
 650 GR: PEN YELLOW;GOTO-45,25 CKEY 7
 660 U: *BLACKKEY
 670 GR: PENBLUE;GOTO-40,25
 680 U: *KEYBETWEEN
 690 GR: PEN YELLOW;GOTO-37,25 CKEY 9
 700 U: *BLACKKEY
 710 GR: PEN BLUE;GOTO-32,25 CKEY 10
 720 U: *KEYBETWEEN
 730 GR: PEN YELLOW;GOTO-29,25 CKEY11
 740 U: *BLACKKEY
 750 GR: PEN BLUE;GOTO-24,25 CKEY12
 760 U: *RIGHTSK
 770 GR: PEN BLUE;GOTO-18,25 CKEY13
 780 U: *LEFTSK
 790 GR: PEN YELLOW;GOTO-13,25 CKEY14
 800 U: *BLACKKEY
 810 GR: PEN BLUE;GOTO-8,25 CKEY15
 820 U: *KEYBETWEEN
 830 GR: PEN YELLOW;GOTO-5,25 CKEY16
 840 U: *BLACKKEY
 850 GR: PEN BLUE;GOTO0,25 CKEY17
 860 U: *RIGHTSK
 870 GR: PENBLUE;GOTO6,25 CKEY18
 880 U: *LEFTSK
 890 GR: PENYELLOW;GOTO11,25 CKEY19
 900 U: *BLACKKEY
 910 GR: PENBLUE;GOTO16,25 CKEY 20
 920 U: *KEYBETWEEN
 930 GR: PENYELLOW;GOTO19,25 CKEY 21
 940 U: *BLACKKEY
 950 GR: PENBLUE;GOTO24,25 CKEY22
 960 U: *KEYBETWEEN
 970 GR: PEN YELLOW;GOTO27,25 CKEY23
 980 U: *BLACKKEY
 990 GR: PENBLUE;GOTO32,25 CKEY24
 1000 U: *RIGHTSK
 1010 GR: PEN BLUE;GOTO38,25 CKEY25
 1020 U: *LEFTSK
 1030 GR: PEN YELLOW;GOTO43,25 CKEY26
 1040 U: *BLACKKEY
 1050 GR: PEN BLUE;GOTO48,25 CKEY 27
 1060 U: *KEYBETWEEN
 1070 GR: PEN YELLOW;GOTO51,25
 1080 U: *BLACKKEY
 1090 GR: PEN BLUE;GOTO56,25 CKEY29
 1100 U: *RIGHTSK
 1110 GR: PEN BLUE;GOTO62,25 CKEY 30
 1120 U: *LEFTSK
 1130 GR: PEN YELLOW;GOTO67,25 CKEY31
 1140 U: *BLACKKEY
 1150 E:
 1160 *MUSIC
 1170 T: TYPE 1 TO9,AND THE LETTERED KEYS
 1180 T: FOR NOTES LOW C TO HIGH F
 1190 T: TYPE M TO END PROGRAM
 1200 A: #5
 1210 MS: 1,2,3,4,5,6,7,8,9,0,M,E,R,T,Y,U,I,O,P,
 A,S,D,F,G,H,J,K,L,Z,X,C,V
 1220 JM: *I,*2,*3,*4,*5,*6,*7,*8,*9,*0,*H,*E,*
 R,*T,*Y,*U,*I,*0,*P,*A,*S,*D,*F,*G,*H,*J,*K,*
 L,*Z,*X,*C,*H
 1230 *I
 1240 GR: PENRED;GOTO-75,0
 1250 U: *EFKEY
 1260 SO: 1
 1270 PA: 32
 1280 SO: 0
 1290 GR: PENBLUE;GOTO-75,0
 1300 U: *EFKEY
 1310 J: *MUSIC
 1320 *Z
 1330 GR: PENRED;GOTO-69,25
 1340 U: *EBLKEY
 1350 SO: 2
 1360 PA: 32
 1370 SO: 0
 1380 GR: PENYELLOW;GOTO-69,25
 1390 U: *EBLKEY
 1400 J: *MUSIC
 1410 *3 CLOW D
 1420 GR: PENRED;GOTO-64,25
 1430 U: *EKBTHN
 1440 SO: 3
 1450 PA: 32
 1460 SO: 0
 1470 GR: PENBLUE;GOTO-64,25
 1480 U: *EKBTHN
 1490 J: *MUSIC
 1500 *4 CLOW D SHARP OR E FLAT
 1510 GR: PENRED;GOTO-61,25
 1520 U: *EBLKEY
 1530 SO: 4
 1540 PA: 32
 1550 SO: 0
 1560 GR: PENYELLOW;GOTO-61,25
 1570 U: *EBLKEY
 1580 J: *MUSIC
 1590 *5 CLOW E
 1600 GR: PENRED;GOTO-56,25
 1610 U: *ERSK
 1620 SO: 5
 1630 PA: 32
 1640 SO: 0
 1650 GR: PENBLUE;GOTO-56,25
 1660 U: *ERSK
 1670 J: *MUSIC
 1680 *6 CLOW F
 1690 GR: PENRED;GOTO-50,25
 1700 U: *LEFTSK
 1710 SO: 6
 1720 PA: 32
 1730 SO: 0
 1740 GR: PENBLUE;GOTO-50,25
 1750 U: *LEFTSK
 1760 J: *MUSIC
 1770 *7 CLOW F SHARP OR G FLAT
 1780 GR: PENRED;GOTO-45,25
 1790 U: *EBLKEY
 1800 SO: 7
 1810 PA: 32
 1820 SO: 0
 1830 GR: PENYELLOW;GOTO-45,25
 1840 U: *EBLKEY
 1850 J: *MUSIC
 1860 *8 CLOW G
 1870 GR: PENRED;GOTO-40,25
 1880 U: *EKBTHN
 1890 SO: 8
 1900 PA: 32
 1910 SO: 0
 1920 GR: PENBLUE;GOTO-40,25
 1930 U: *EKBTHN
 1940 J: *MUSIC
 1950 *9 CLOW G SHARP OR A FLAT
 1960 GR: PENRED;GOTO-37,25
 1970 U: *EBLKEY
 1980 SO: 9
 1990 PA: 32
 2000 SO: 0
 2010 GR: PENYELLOW;GOTO-37,25
 2020 U: *EBLKEY
 2030 J: *MUSIC
 2040 *0 CLOW A
 2050 GR: PENRED;GOTO-32,25
 2060 U: *EKBTHN
 2070 SO: 10
 2080 PA: 32
 2090 SO: 0
 2100 GR: PENBLUE;GOTO-32,25
 2110 U: *EKBTHN
 2120 J: *MUSIC
 2130 *H CLOW A SHARP OR B FLAT
 2140 GR: PENRED;GOTO-29,25
 2150 U: *EBLKEY
 2160 SO: 11
 2170 PA: 32
 2180 SO: 0
 2190 GR: PENYELLOW;GOTO-29,25
 2200 U: *EBLKEY
 2210 J: *MUSIC
 2220 *E CLOW B
 2230 GR: PENRED;GOTO-24,25
 2240 U: *ERSK
 2250 SO: 12
 2260 PA: 32
 2270 SO: 0
 2280 GR: PENBLUE;GOTO-24,25
 2290 U: *ERSK
 2300 J: *MUSIC
 2310 *R C MIDDLE C
 2320 GR: PENRED;GOTO-18,25
 2330 U: *LEFTSK
 2340 SO: 13
 2350 PA: 32
 2360 SO: 0
 2370 GR: PENBLUE;GOTO-18,25
 2380 U: *LEFTSK
 2390 J: *MUSIC
 2400 *T C SHARP OR D FLAT
 2410 GR: PENRED;GOTO-13,25
 2420 U: *EBLKEY
 2430 SO: 14
 2440 PA: 32
 2450 SO: 0
 2460 GR: PENYELLOW;GOTO-13,25
 2470 U: *EBLKEY
 2480 J: *MUSIC
 2490 *Y C
 2500 GR: PENRED;GOTO-8,25
 2510 U: *EKBTHN
 2520 SO: 15
 2530 PA: 32
 2540 SO: 0
 2550 GR: PENBLUE;GOTO-8,25
 2560 U: *EKBTHN
 2570 J: *MUSIC
 2580 *U C SHARP OR E FLAT
 2590 GR: PENRED;GOTO-5,25
 2600 U: *EBLKEY
 2610 SO: 16
 2620 PA: 32
 2630 SO: 0
 2640 GR: PENYELLOW;GOTO-5,25
 2650 U: *EBLKEY
 2660 J: *MUSIC
 2670 *I C
 2680 GR: PENRED;GOTO0,25
 2690 U: *ERSK
 2700 SO: 17
 2710 PA: 32
 2720 SO: 0
 2730 GR: PENRED;GOTO6,25
 2740 U: *LEFTSK
 2750 U: *LEFTSK
 2760 *D C
 2770 GR: PENRED;GOTO6,25
 2780 U: *LEFTSK
 2790 SO: 18
 2800 PA: 32
 2810 SO: 0
 2820 GR: PENBLUE;GOTO6,25
 2830 U: *LEFTSK
 2840 J: *MUSIC
 2850 GR: PENRASE;GOTO11,25
 2860 *P C SHARP OR G FLAT
 2870 GR: PENRED;GOTO11,25
 2880 U: *EBLKEY
 2890 SO: 19
 2900 PA: 32
 2910 SO: 0
 2920 GR: PENYELLOW;GOTO11,25
 2930 U: *EBLKEY
 2940 J: *MUSIC
 2950 *A C
 2960 GR: PENRED;GOTO16,25
 2970 U: *EKBTHN
 2980 SO: 20
 2990 PA: 32
 3000 SO: 0
 3010 GR: PENBLUE;GOTO16,25
 3020 U: *EKBTHN
 3030 J: *MUSIC
 3040 *S C SHARP OR A FLAT
 3050 GR: PENRED;GOTO19,25
 3060 U: *EBLKEY
 3070 SO: 21
 3080 PA: 32
 3090 SO: 0
 3100 GR: PENYELLOW;GOTO19,25
 3110 U: *EBLKEY
 3120 J: *MUSIC
 3130 *D C A
 3140 GR: PENRED;GOTO24,25
 3150 U: *EKBTHN
 3160 SO: 22
 3170 PA: 32
 3180 SO: 0
 3190 GR: PENBLUE;GOTO24,25
 3200 U: *EKBTHN
 3210 J: *MUSIC
 3220 *F C A SHARP OR B FLAT
 3230 GR: PENRED;GOTO27,25
 3240 U: *EBLKEY
 3250 SO: 23
 3260 PA: 32
 3270 SO: 0
 3280 GR: PENYELLOW;GOTO27,25
 3290 U: *EBLKEY
 3300 J: *MUSIC
 3310 *G C B
 3320 GR: PENRED;GOTO32,25
 3330 U: *ERSK
 3340 SO: 24
 3350 PA: 32
 3360 SO: 0
 3370 GR: PENBLUE;GOTO32,25
 3380 U: *ERSK
 3390 J: *MUSIC
 3400 *H C HIGH C
 3410 GR: PENRED;GOTO38,25
 3420 U: *LEFTSK
 3430 SO: 25
 3440 PA: 32
 3450 SO: 0
 3460 GR: PENBLUE;GOTO38,25
 3470 U: *LEFTSK
 3480 J: *MUSIC
 3490 *J C HIGH C SHARP OR D FLAT
 3500 GR: PENRED;GOTO43,25
 3510 U: *EBLKEY
 3520 SO: 26
 3530 PA: 32
 3540 SO: 0
 3550 GR: PENYELLOW;GOTO43,25
 3560 U: *EBLKEY
 3570 J: *MUSIC
 3580 *K C HIGH D
 3590 GR: PENRED;GOTO48,25
 3600 U: *EKBTHN
 3610 SO: 27
 3620 PA: 32
 3630 SO: 0
 3640 GR: PENBLUE;GOTO48,25
 3650 U: *EKBTHN
 3660 J: *MUSIC
 3670 *L C HIGH D SHARP OR E FLAT
 3680 GR: PENRED;GOTO51,25
 3690 U: *EBLKEY
 3700 SO: 28
 3710 PA: 32
 3720 SO: 0
 3730 GR: PENYELLOW;GOTO51,25
 3740 U: *EBLKEY
 3750 J: *MUSIC
 3760 *Z C HIGH E
 3770 GR: PENRED;GOTO56,25
 3780 U: *ERSK
 3790 SO: 29
 3800 PA: 32
 3810 SO: 0
 3820 GR: PENBLUE;GOTO56,25
 3830 U: *ERSK
 3840 J: *MUSIC
 3850 *X C HIGH F
 3860 GR: PENRED;GOTO62,25
 3870 U: *LEFTSK
 3880 SO: 30
 3890 PA: 32
 3900 SO: 0
 3910 GR: PENBLUE;GOTO62,25
 3920 U: *LEFTSK
 3930 J: *MUSIC
 3940 *C C HIGH F SHARP
 3950 GR: PENRED;GOTO67,25
 3960 U: *EBLKEY
 3970 SO: 31
 3980 PA: 32
 3990 SO: 0
 4000 GR: PENYELLOW;GOTO67,25
 4010 U: *EBLKEY
 4020 J: *MUSIC
 4030 *M CEND PROGRAM OPTION
 4040 SO: 0
 4050 E:

REVIEW: MICRO-PAINTER
(DataSoft, 19519 Business Center Dr., Nothridge, CA 91324,
\$35)

review by Graham Smith

DataSoft's MICRO-PAINTER is a new and incredible graphics program for the Atari. This machine language program is very flexible and easy to use. With little practice and a thorough reading of the excellent manual anyone can create computer art of varied complexity.

Booting the disk reveals an Options Menu which lists: Catalog, Load File, Save File, Lock File, Unlock File, Delete File, and Rename File. If you pick the Catalog option 9 pre-designed picture titles appear on the screen from which to choose. Loading any of these pictures will show a white background with black outlines of the subject matter. This looks identical to what you see in a child's coloring book. Along the top of the screen is a horizontal bar which shows one of 3 modes in use, a selection of 4 patterns (horizontal stripe, vertical stripe, checkerboard, and solid), and 4 basic colors from which to choose.

In the Fill mode usually used in the "coloring book" designs, the joystick is used to move a cursor into a selected pattern or color area at the top of the screen and the joystick button is pressed. This is similar to dipping a brush in paint. The cursor is then moved into a selected area of the design and the button is pressed again to fill the area. If you don't like what you see happening you press the BREAK key and the fill action is aborted. If the filling is completed and you don't like it, hit the U key (undo) and the fill disappears.

The mode selection, which is controlled by the SELECT key, consists of the Fill mode as well as a Draw mode and a Rubber Band line mode. The Draw mode enables you to "dip" the cursor into a color and use the joystick to create lines on existing patterns or new line drawings. Since the joystick movement is not linear, I found the Draw mode very hard to control.

The Rubber Band line mode is unique and offers pin-point control. In this mode the cursor is moved to the starting point of a line and the joystick button is pressed to anchor the line. The line then follows the cursor wherever it is moved on the screen. When you get the line precisely where you want it you have only to press the joystick button to complete the line. Great control is possible.

In any of the 3 modes, hitting the SPACE BAR will shift the screen into a Microscope option. Here you move from full screen to a magnified view of a selected area with the cursor. Microscope is an excellent tool for making close-up additions and corrections to a picture.

There are many fine extra touches in the program. One control worth mentioning from a creative standpoint is the ability to hit the N key and immediately see the entire picture in complimentary colors. Another control allows you to change any or all of the 4 basic colors and luminosities.

The outline patterns included in the package are good for learning to control MICRO-PAINTER but they do not do much for the creative artist. Coloring books are more copying than creating. However, any of the patterns can be erased from the screen with the SHIFT-CLEAR key. The erased screen then allows you to use all 3 modes to create your own design. This is where the fun begins.

In my own creations I drew almost entirely with the Rubber Band mode, frequently shifting to Microscope for fine control. I usually followed with the Fill mode and occasionally shifted back and forth between modes to "fine tune" the design. To complete the design, I then used the color shift control before saving to disk.

This is a superior program. The documentation is fully illustrated, intelligently written, and easy to follow. My only reservation is that MICRO-PAINTER seems to me to emphasize the "coloring book" or copy approach which is somewhat less than creative. On the other hand, maybe the designers were trying to create a product with something for everyone. I think they succeeded.

Atari Pascal
by George Shields, Spokane, WA

The new APX Pascal contains the latest ISO draft standards, which is the de-facto in the Pascal world i.e. Microsoft. Some features similar to BASIC are graphics, I/O commands, arithmetic precision i.e. 8 digit ± 100 exponent (using FP in ROM), external programs moduals linked from a library, and indefinite length programs (by chaining them together).

First let it be perfectly clear that two disk drives are required and 48K of memory. Double density drives would be the best due to the default of drive 1 (From Percom or the Leading Edge). Also some kind of text editor is necessary i.e. Text Wizard, APX MEDIT, ATARI Editor Assembler, Extremely useful is a 80 col. printer due to the limited screen (40 col.), where as Pascal programs are written in 80 column format.

While its true that Pascal is more difficult to learn than BASIC (recommended before Pascal). It does have a place for students learning computer data structures, or in house business developments. The lanuages of the future will be patterned simliar to Pascal (Touch the future).

Why use Pascal? Well it is much faster than BASIC (3-8 times faster, like FORTH). It has a block structure that is practically self documenting, expanded commands (common with other high level languages) that give greater control over a program, and the ability to define the data type your working with i.e. integer operation.

Some of the drawbacks include the following: it requires a lot of previous knowledge of Pascal (see book list). There is not the usually long variable names (your limited to 8 char. or 6 for external files). It does not have a 80 column editor for writing the Pascal programs like Chameleon or DATASM/65. If anything goes wrong there is a possibility the system may lock up. The output printing isn't very fast but of a more constant speed than BASIC. APX Pascal is very disk bound. For example, disk one (the linker) has only 229 free sectors for program space. Disk two (the compiler) has only 17 free sectors. This combined with the default of the linker on drive 1 and the default of the compiler on drive 1 causes lots of disk changing, that can be very confusing. You then have your program on drive 2. This is because of the large memory requirments of Pascal so you can have enough room for all the files produced by the compiler. In fact most Pascal systems require a minimum of 64K of memory, so it was quite a task to implement a full version.

Over all, this is a real bargain. It is a fine implimentation of the Pascal language with no bugs (yet). The manual is adequate for those KNOWING Pascal but leaves a lot to be desired for those used to ATARI quality type documentation. I would encourage some one to write a machine language compiler for Pascal. Even though the p-code approaches machine language, you still need two fair size programs to run the p-code. Pascal is well worth while, once you spend the time learning it because it can cut your program development down by a factor of eight due to the block structuring.

Books recommended:
Programming IN PASCAL BY Peter Grogono, or Introduction To PASCAL BY Rodney Zaks

NEXT MONTH: A PARALLEL DOUBLE DENSITY DRIVE by Leading Edge



DECODE FUNCTION

Bill Wilkinson, in his Insight! Atari column in the October, 1981 issue of COMPUTE, describes a way to create unreadable (actually, unLISTable) BASIC programs. He does this by stuffing linend characters (nulls would do as well) in the variable name table in the header of the tokenized BASIC program. It works marvelously!

If you want to be able to read and edit one of these "coded" programs, you must decode it by putting dummy names in the name table. The DECODE function described here does this automatically. Dummy names are assigned as follows:

```
10 REM *****
20 REM ** UTILITY FOR RESTORING *
30 REM *CLOBBERED VARIABLE NAMES*
40 REM ***IN BASIC PROGRAMS***
50 REM *** S. GREENBERG ***
60 REM *** MARCH, 1982 ***
70 REM *****
80 DIM I$(1024),O$(1024),FNAME$(16),FNAME$(
16),HOR(7)
90 ? "Y"? "PLEASE WAIT ...":GOSUB 1000
110 FNAME$="" :FNAME$=FNAMEI
$
120 ? "Y"? "Y"? "ENTER BASIC FILE SPEC"
130 ? "Y"? "=>";
140 TRAP 140:INPUT FNAMEI$
150 TRAP 40000:OPEN #2,4,0,FNAMEI$
160 ST=1:AR=1:SC=1:I$(1)= "" :I$(1000)= "" :I$(
2)=I$:O$=""
170 A=USR(1658,ADR(I$),14,2,7):REM READ HEADE
R RECORD
180 IF A<0 THEN END
190 FOR I=1 TO 7:HOR(I)=ASC(I$(2*(I-1)+1))+25
6*ASC(I$(2*I)):NEXT I
250 REM READ THE VALUE TABLE TO DECODE THE TY
PE OF VARIABLE
255 REM AND STORE DUMMY NAMES TO BE WRITTEN I
NTO NAME TABLE
260 VTLEN=HOR(3)-HOR(2):VLEN=HOR(5)-HOR(4):N
VARS=INT(VLEN/8):IF NVARS=0 THEN END
265 REM SKIP OVER VARIABLE NAME TABLE AND REA
D VALUE TABLE
270 A=USR(1658,ADR(I$),VTLEN+1,2,7):A=USR(165
8,ADR(I$),VLEN,2,7)
```

```
275 REM LOOP TO CREATE DUMMY NAMES
280 FOR I=1 TO NVARS:PTR=1+(I-1)*8:FBYTE=ASC(
I$(PTR,PTR)):IF FBYTE=0 THEN 320
290 IF FBYTE>=80 THEN 340
300 O$(LEN(O$)+1)="AR":O$(LEN(O$)+1)=STR$(AR)
:AR=AR+1
310 O$(LEN(O$)+1)=CHR$(168):GOTO 360
320 O$(LEN(O$)+1)="SC":O$(LEN(O$)+1)=STR$(SC)
:SC=SC+1
330 PTR=LEN(O$):O$(PTR)=CHR$(128+ASC(O$(PTR,P
TR))):GOTO 360
340 O$(LEN(O$)+1)="ST":O$(LEN(O$)+1)=STR$(ST)
:ST=ST+1
350 O$(LEN(O$)+1)=CHR$(164)
360 NEXT I:DIFF=LEN(O$)-VTLEN:VTLEN=LEN(O$)
365 REM ***** END OF LOOP *****
370 FOR I=3 TO 7:HOR(I)=HOR(I)+DIFF:NEXT I
375 O$(LEN(O$)+1)=CHR$(0):REM ADDS XTRA NULL
BYTE
380 ? "Y"? "Y"? "ENTER OUTPUT FILE SPEC"
390 ? "Y"? "=>";
400 TRAP 400:INPUT FNAMEO$
410 TRAP 40000:OPEN #3,8,0,FNAMEO$
420 FOR I=1 TO 7:HIGH=INT(HOR(I)/256):LOW=HOR(
I)-256*HIGH
430 PUT #3,LOW:PUT #3,HIGH:NEXT I
440 A=USR(1658,ADR(O$),LEN(O$),3,11):REM WRIT
E DUMMY NAME TABLE TO FILE
450 A=USR(1658,ADR(I$),VLEN,3,11):REM WRITE
VARIABLE VALUE TABLE TO FILE
455 REM ***** WRITE REST OF FILE *****
460 RMDRFILE=HOR(7)-HOR(5):NBLKS=INT(RMDRFILE
/1024):RMDR=RMDRFILE-NBLKS*1024
```

Scalars - SCi
Strings - STi
Arrays - ARi

where the value of i is assigned sequentially.

The DECODE program asks you for the name of a file containing the tokenized BASIC program. It will then prompt you for the name of the file in which to SAVE the DECODED program. DECODE should work on any program, whether it has been encoded or not.

by Stu Greenberg

```
470 IF NBLKS=0 THEN 500
480 FOR I=1 TO NBLKS:A=USR(1658,ADR(I$),1024,
2,7)
490 A=USR(1658,ADR(I$),1024,3,11):NEXT I
500 A=USR(1658,ADR(I$),RMDR,2,7):A=USR(1658,A
DR(I$),RMDR,3,11)
510 END
1000 FOR QYZ144=1536 TO 1729:READ QYZ145:POKE
QYZ144,QYZ145:NEXT QYZ144:RETURN
1010 DATA 104,104,133,225,104,133,224,104,133
,227,104,133,226,169,0,160
1020 DATA 0,145,224,196,226,240,4,200,76,17,6
,96,104,104,133,225
1030 DATA 104,133,224,104,133,227,104,133,226
,104,133,229,104,133,228,160
1040 DATA 0,196,226,240,12,177,228,145,224,19
6,226,240,4,200,76,53
1050 DATA 6,166,227,224,0,240,50,165,224,24,1
01,226,133,224,165,225
1060 DATA 105,0,133,225,165,228,24,101,226,13
3,228,165,229,105,0,133
1070 DATA 229,177,228,145,224,192,255,240,4,2
00,76,97,6,202,240,9
1080 DATA 230,225,230,229,160,0,76,97,6,96,10
4,104,133,225,104,133
1090 DATA 224,104,133,227,104,133,226,104,104
,133,228,104,104,133,229,165
1100 DATA 228,10,10,10,170,165,229,157,66,
3,165,224,157,68,3
1110 DATA 165,225,157,69,3,165,226,157,72,3,1
65,227,157,73,3,32
1120 DATA 96,228,48,7,169,0,133,212,133,213,9
6,169,0,133,213,132
1130 DATA 212,96
```

PAC-MAN

review by Mark Norland

ATARI has finally put out a cartridge based game which should rival the ever popular Star Raiders. The program is PAC-MAN.

Pac-Man apparently uses character graphics to provide the user with a game very similar to the arcade version, but with some changes in features.

ATARI Pac-Man has 3 minor differences and a major improvement over the arcade counterpart. The Galaxian and Pineapple are replaced by the ATARI trademark and a lime. There are no cartoon intermissions, a probable disappointment for our very young readers; and there is a different set of patterns used.

The major improvement is the addition of a prize (fruits, keys, etc.) level selector for the advanced player.

Pac-Man is a very entertaining program and should be added to your software collection. On a scale of 1 to 10, I rate Pac-Man an 8.

--Mark C. Norland



Notes

Hank Hirschfeld sent a message over the Bulletin Board that the setting up file for "Chicken Dressing" in the May ACE should be PRINT #7;0: CLOSE #7 ***NOT*** INPUT #7;0: CLOSE #7.

LET ME KNOW IF THE CONDENSED PRINT USED FOR THIS MONTHS LISTINGS ARE READABLE. Several readers felt the proportional print used before made it hard to read; perhaps this will be better. Please let us know what you want.

If anyone has the new disk drives or other peripherals mentioned this month, please send a review!



MUSICBOX by P.D.I.

(by Jerry White, P.D.I., 11 Idar Ct., Greenwich, CT 06830, \$30)

a review by Ron Ness

I just had a chance to glance at a pre-release copy of this program, and if you are into music on the Atari, I am sure you will be interested in this disk.

MUSICBOX is a group of music related programs written by Jerry White, Craig Patchett, and Charles Bachand. Required are BASIC, 32K, and a disk drive. The Music Composer cartridge is also required if you wish to take full advantage of all the programs on this disk.

The most interesting program on this is one called COLORGAN. This turns your TV into a color organ which changes colors and intensity as the music plays.

There are several samples of music on the disk including THE ENTERTAINER (played with only 2 or 3 notes), SOLACE (played much too fast), STARS & STRIPES FOREVER (called March and sounds great!), and one called USSR. This last number has a rock beat which sounds super and has kept me awake for the last 3 nights trying to figure out where I have heard it before. [It's a BEATLES tune, --JB, ed.]

Another program called MUSICBOX uses a redefined character set to display the notes on the staff and show at the bottom of the screen the Music Composer values. With this program, you can sit down with a sheet of music and jot down the note values to be entered when using the Music Composer cartridge. I found this to be very helpful.

Once you have written down the notes to be used with the Composer cartridge, you can plug it in and do your thing. When you are finished, you can go back to BASIC and debug using the DECOMPOS program or run off a printed copy to share with a friend.

Now, assuming your music is up and running with the Music Composer cartridge, you can go to the CONVERT program and convert it so it can be read by the COLORGAN and PLAYTEST programs.

This last program, called PLAYTEST, plays the music during the vertical blanks. The documentation and REMs explain how to merge your own program into this one. I haven't had time to fully check this out, but it appears you can have your Atari sing while balancing your checkbook. Can you imagine it playing 'Happy Days Are Here Again' for a deposit or the 'Triumphal March' from Aida for an income tax refund? How about a sing-a-long complete with bouncing ball?

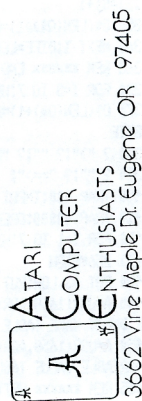
There are a number of other features in this group of programs which are too numerous to go into here, such as note decay (sound fades away) and the use of the joystick or arrow keys to determine note values. These features allow you to put more 'character and expression' into your Music Composer based programs.

The accompanying documentation assumes the user has a fair knowledge in the use of BASIC and the use of the Music Composer cartridge. With this in mind, I feel you will enjoy 'fiddling around' with this disk.

ACE BB (503)343-4352

To use the ARMUDIC-ACE Bulletin Board, set your program to Light translation, Full Duplex, No send parity, Mark (ignore) receive parity, one Stop bit, and Baud rate 300. Until we get our full time board, it is up most nights from about 10 PM PDT until Brian rolls out of bed in the morning. If it rings more than once, it is down; but no-one will answer the phone.

The next issue will be the combined Aug/Sept issue, so send your articles in now; otherwise you will have to wait until Oct.



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